AN INVENTION THAT MAY REVOLUTIONIZE NAVAL WARFARE and MARINE ENGINEERING

STEADY FLOATING STEEL STRUCTURES MADE POSSIBLE BY USE OF ENORMOUS WATER PRESSURE AT A DEPTH IN THE OCEAN TO PROVIDE STATIC RESISTANCE TO WAVE ACTION

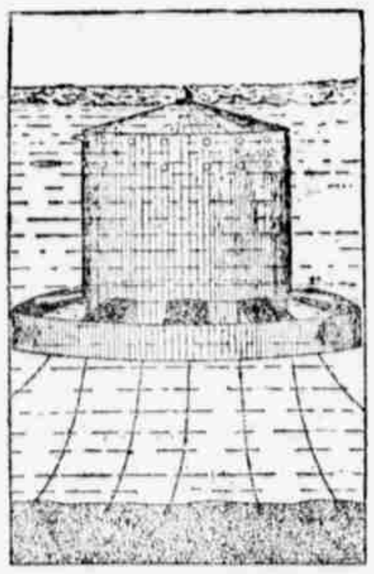
NEW YORK.—To dot the coast with floating lighthouses that will be "lamposts of the sea;" to have floating fortresses and torpedo stations permanently anchored off all of the coastal cities; to supply harbors with breakwaters of a mobile type; to provide the navy with coaling stations out at sea; to furnish isolated quarantine stations to such ports of entry as have not convenient islands in their harbors; even to establish relay wireless stations far out in the ocean—these are among the possibilities of William Edward Murray's invention of the principle of building what he calls "steady floating steel structures."

It is said by marine authorities that Mr. Murray has solved some of the most difficult problems with which mariners and naval engineers have wrestled without success for years. By applying the Murray principle of steady flotation, it is held, harbor accommodations can be enlarged almost indefinitely at a comparatively low cost; danger signal lights easily can be placed at points on the coast where heretofore lighthouses have been impossible on account of the absence of rock foundations, and last but not least, cities, shipping harbors, arsenals and dockyards can be guarded absolutely from bombardment by a large foreign fleet, at the same time allowing battleships free rein in the conduct of offensive operations instead of keeping them on the defensive close to home.

Idea Is Simplicity Itself.

In common with every great revolutionary invention this idea of Murray's is extremely simple. As a rear admiral of the American navy said to the inventor, after the scheme had been explained to him, "the thing has been staring us in the face for a hundred years and yet no one has ever thought of it before. It's as clear as daylight and as certain as doom." But the inventor had worked at the problem for eight years before he succeeded in demonstrating to himself—he is a practical engineer—that his principle was a sound one and capable of absolute demonstration. And, although his final patents were granted only by our government in July last, his invention already has attracted the favorable attention of engineering authorities both in this country and in Canada, in Great Britain, France and Germany. President Roosevelt is said to be greatly interested in it.

In a few words, Mr. Murray has discovered how to keep a floating structure steady and unmoved in the



Steel Torpedo Station.

midst of more or less agitated waters. This is a problem which has faced nautical engineers for years and which hitherto has remained unsolved. He has discovered how to utilize a well-known law of nature. All students of physics know that the pressure of water increases directly in proportion to the water's depth. Simply stated, then, Mr. Murray has designed a structure which reaches to a depth sufficient for the enormous pressure of the thousands of tons of water above to counteract the force of wave disturbance at and near the surface of the water.

The simplest application of Mr. Murray's principle provides a buoyant steel caisson which is sunk down into the tranquil areas of ocean depths, far below the comparatively limited portion of wave-disturbed water near the surface. These steel caissons have at their base a wide flange, extending all around and heavily weighted. Upon these flanges the water above rests, pressing down with enormous weight, exerting at 32 feet below the surface a pressure of 2,160 pounds per square foot, or at a 60-foot depth a pressure of more than two tons per square foot. The inert weight of the structure itself and the weight of the water upon it more than counterbalances the action of the waves above. Imagine an ordinary tin basin turned upside down and submerged, and you get an idea of the Murray foundation. Upon this steady floating foundation, then, any desired superstructure may be built—lighthouse, fortress or living or storage room of any kind.

The whole structure, then, in its steadiness and immobility, might be likened to a floating iceberg. To anyone who has ever gone to sea in the winter time one of the wonders of the deep must ever be a sight of a great iceberg floating steadily with the current, no matter how violently the great waves beat against its sides. Every schoolboy knows that this steadiness of the floating mass of ice is owing to the fact that two-thirds of its bulk is below the level of the sea. And it is partly this principle and partly the additional one of adding to the depth below water the widely projecting flange of steel that makes Murray's invention so valuable and important in the eyes of all marine engineers. The downward thrust on this flange of the immense weight of stable water is the great secret of the practicability of this invention.

Only Surface of Sea Agitated.

Countless experiments by marine engineers all over the world have demonstrated the fact that the depth to which the wave disturbance of the surface of the sea extends averages 15 feet. A homely proof of this is to be found in the way in which a diver can work on the bed of the ocean without feeling the slightest effect from any motion of the waves over his head. And in many of the long-time submersion tests of submarine craft the crews have sunk below the level in a calm and risen to the surface in a storm without feeling any indications of the above-surface disturbance.

Not only is the Murray principle applicable to lighthouses and lightships and floating fortresses, but to every class of stationary marine structures—such, for instance, as breakwaters and piers; bridges across arms of the sea or detached areas of water; submerged torpedo stations whose steadiness will give hidden gunners deadly aim; floating coaling stations, provision and oil storage depots and even hospitals and temporary hotels.

Applied commercially, the Murray invention may revolutionize breakwater construction. Millions of dollars have been spent in the building of breakwaters in the creating of a good harbor or the construction of a large railroad and shipping terminal, and in a number of cases these breakwaters, after much time, money and effort had been expended, have been declared insufficient and unsatisfactory. These breakwaters have been built up from the bottom of harbors by the dumping in of enormous quantities of rock at huge cost. The Murray system, it is declared, will do away with this expensive construction entirely. The Murray breakwater is built in sections, each section resembling an inverted vessel, the upturned keel doing the work of breaking the force of the inrolling waves and the great projecting bulk underneath held steadily by the pressure of the water.

Of Value for Lightships.

One of Mr. Murray's chief claims of the value of his invention, however, lies in its application to another, and more picturesque, marine structure—the lightship. As lightships now are constructed, it is impossible for them to carry a light at a greater height than 20 feet above their decks. In addition, they must always be anchored close to the reef or shoal over which they stand guard, since it is not possible for their crews to handle anchors or cables that would enable them to lie in positions further off shore. Besides this, a lightship not infrequently goes adrift in the buffetings of winter's gales, and so long as the ship is missing or until a relief vessel can take its place the dangerous spot must remain unguarded.

The modern lightship built by the government costs about $115,000, while they are expensive vessels to maintain. It is the contention of the inventor of this new type of floating structure that all of the points of weakness in the present type of lightship would be done away with through the introduction of his model. A circular structure with a flange around its base could be anchored anywhere along the coast and not directly over the reef or shoal to be guarded, but out beyond it, since once anchored there would be no fear of its going adrift in a storm. Heavier anchors and chains than an old-type lightship could carry or handle would make this certain, for one thing, and the principle on which it is constructed would do the rest. Then these floating lights could be built with 80-foot lanterns, instead of the present standard, and crews would be unnecessary, since some of the water ballast compartments, which are used to help in sinking the structures, could be filled with illuminating oil and the lamp fed automatically. Filled in the summer time these tanks and lights would need no attention until the next year came around. With such a structure in use the problem of guarding with a warning light a spot like the Diamond shoals, off Hatteras, would be speedily solved. There would be none of the difficulty commonly experienced in building a lighthouse on an almost inaccessible point, as the lightships could be built in harbor and then towed to the point where needed. It is computed that one of these "steady floating" lightships could be built complete for about $10,000.

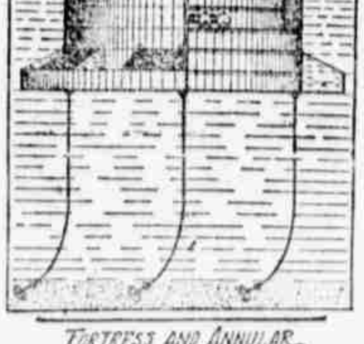
Its Advantage Commercially.

While it is declared the Murray idea can be used to enormous advantage commercially, it is its protective features, as applied to coast defense, that have aroused most interest in other quarters. War and navy department officials have been interested especially in the steady floating fortresses and torpedo stations designed by Mr. Murray. On the great steel caisson submerged in the quiet depths of the ocean is built a special annular revolving deck, fully equipped with guns. Now the turret of a battleship is necessarily limited by the size of the ship's deck and its arc of fire is restricted, but on the Murray fortress there need be no restriction as to size or the number of guns. Again battleship gunners are more or less hampered by the rolling and tossing of the vessel, which makes good aim an uncertain proposition, but on a steady floating structure guns could be pointed with mathematical accuracy. No enemy's attacking fleet would have chance against an array of these immobile fortresses. While their gunners were waiting for their vessels to roll so as to bring their guns to bear, they would be withered by a fire of deadly aim from a deck as solid as if mounted upon a rock. A fleet running up against these floating fortresses placed several miles outside a city would be destroyed before it got even within striking distance of the city itself.

In addition, a fleet of battleships before a line of these steady floating fortresses would be like so many eggs pitted against a solid cannon ball. The armor plating on the fortresses can be made of indefinite thickness, and its domed surface would deflect a striking shell off into the harmless air.

Impregnable Defense.

Then, too, upon the solid steel floating foundations torpedo stations could be placed, submerged and totally in-

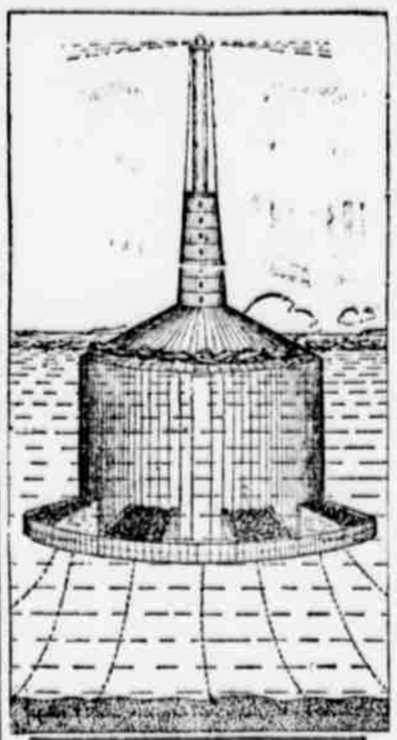


FORTRESS AND ANNULAR REVOLVING GUN PLATFORM

visible, and the steady platform from which the torpedoes were fired would make the aim of the men behind certain and true. These fortresses and torpedo stations could be protected from torpedo boats and even submarine boats by heavy barriers of steel netting surrounding each. Then, with fields of mines laid between, the utter destruction of any attacking fleet would be certain.

Any coast, too, lined with these steady floating fortresses could consider itself amply protected, and would need no fleet of battleships tied close to home. All ocean-going vessels of war could be permitted to roam about and enter upon offensive operations wherever desired. The floating fortresses would have little machinery or other mechanism to bother with, and only enough men to serve the guns would be required.

If Mr. Murray's inventions are adopted by the government, the problem of providing a large number of battleships for the defense of the coast and the protection of outlying islands belonging to Uncle Sam will become less pressing. The island possessions of the United States will be considered safe, guarded by a cordon of floating fortresses, and the general adoption of them along the American coast is apt to change the European viewpoint to a considerable extent. No foreign nation will be eager to rush



MURRAY STEADY FLOATING LIGHTHOUSE

into a fight with so well protected a country as the United States.

The inventor of this new system of marine construction is an American engineer, a Californian by birth, and of Scotch descent. It is asserted by marine authorities that his discovery means a definite step forward in the world's progress and that his inventions are the most momentous since the substitution of steel for wood in naval construction.

CHINAMAN MADE IT CLEAR.

And Without the Use of Any "Pigeon English," at That.

Numberless are the tricks which newspaper reporters play upon one another to relieve the somber "grind" of their calling. Two young men, employed on a morning paper in a large American city, were detailed one day to call upon the resident Chinamen and "interview" them respecting some immigration measure then pending in congress. One of the two reporters was a beginner, and the other, an experienced man, naturally assumed the management of the matter.

"Billings," he said, after they had invaded several laundries without any important result, "here is a tea store. I wish you would go in and talk with the proprietor. I want to know what he thinks about Chinamen voting. I'll go on and have an interview with the man who runs this cigar shop next door. Remember to use the very simplest English at your command."

The young reporter went inside the tea store, took out his note book and thus addressed the proprietor, who happened to be alone at the moment:

"John, how? Me—me—Telegraph, John! Newspape—savvy, John? Newspape—print things. Un'stan'? Me want know what John think about Chinaman vote, see? What John think—Chinaman—vote—all same Melican man? Savvy, John? Vote? Whatthink?"

The Chinaman listened to him with profound gravity until he had finished and replied:

"The question of granting the right of suffrage to Chinese citizens who have come to the United States with the avowed intention of making this country their permanent home is one that has occupied the attention of thoughtful men of all parties for years, and it may become in time one of paramount importance. At present, however, it seems to me there is no exigency requiring an expression of opinion from me upon this subject. You will please excuse me."

The young reporter went outside and leaned against a lamp-post to recover from a sudden faintness that had seized him. His comrade had purposely "steered him against" one of the best educated Chinamen in the United States.—London Tit-Bits.

A Successful Life.

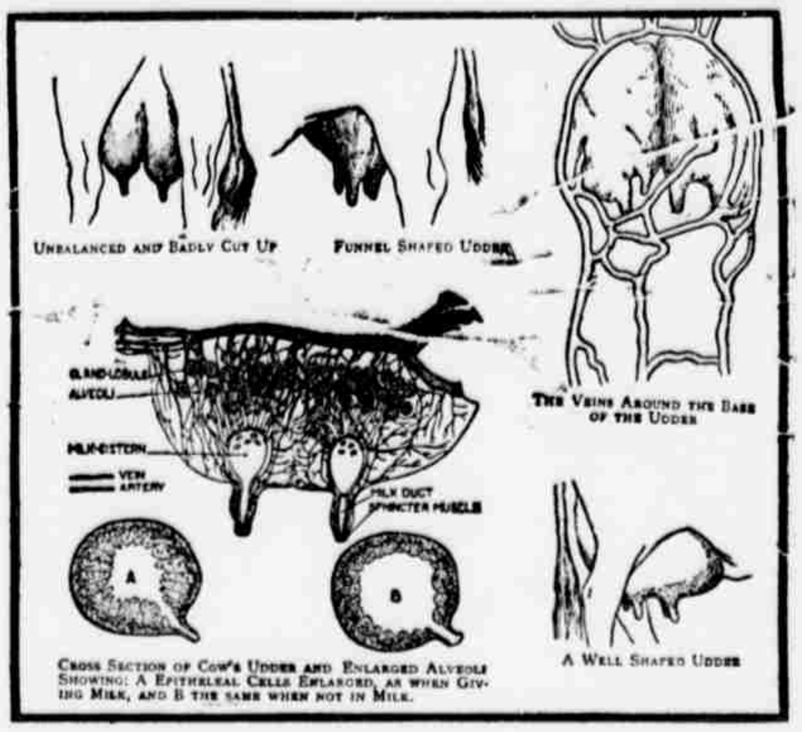
A successful life is rather hard to define, for the definition varies at different times and under different conditions, and yet in the midst of this material age there has dwelt a successful woman. She has not large means, she is dependent upon her own labor, and she lives a simple, retired life; she is totally blind, and yet we question whether there are many who in present peace of mind, and exalted vision of faith, have attained unto all that is desirable in life so nearly as Fanny Crosby, the hymn writer, who at 88 years of age reigns queen of human happiness.—Universalist Leader.

Owns Much British Land.

The marquis of Stafford, who is in his twentieth year, is heir to the most extensive domain, if not the largest rent roll, enjoyed by any subject of King Edward. More than 1,000,000 acres in England and Scotland are under the lordship of his father, the duke of Sutherland, while the marquis of Breadalbane, who is probably the next largest proprietor in the kingdom, does not own half that amount of land.

THE UDDER OF THE COW

Anatomy of This Vital Part of the Good Dairy Animal.



CROSS SECTION OF COW'S UDDER AND ENLARGED ALVEOLI SHOWING: A EPITHELEAL CELLS ENLARGED, AS WHEN GIVING MILK, AND B THE SAME WHEN NOT IN MILK.

Unlike the beef animal the dairy cow has been trained for centuries for the specific purpose of converting the raw materials into milk. In the best animals of the dairy type this has resulted in producing a type of cow quite distinct from her beefy sister. Instead of that deep, low set, blocky form, we have an angular form, with prominent hook and pin bones, lean sharp withers, refined head and neck. Generally speaking, she is said to be wedge-shaped. As a matter of fact all good dairy cows do not possess this form. Exceptions are found in great numbers and the fact makes one rather distrustful of saying that all cows possessing good dairy form are good producers or that all beefy types should be eliminated from the dairy herd.

In general, the productive capacity of a dairy cow depends upon three things; first, the number and activity of the gland lobules; secondly, the power to digest and assimilate food; and thirdly, the amount of blood which flows through the secretory system. The above factors are inherent to the cow and may not be changed. Other factors as the care, feed and management are directly under the control of man.

Indications of the numbers of the gland lobules are to be found in the udder. A large, well-balanced udder extending well forward under the abdomen and hung well back is indicative that there is at least room for

Longitudinal Section of a Quarter of an Udder.

the presence of numerous gland lobules with their containing a lucoli and secretory cells. If coupled with this we have an udder that is not fleshy but soft and pliable we have further reason to believe that at least the milk secreting machinery gives promise of fulfilling its destined purpose and at the same time filling the pail with the white foaming milk. You cannot separate 1,000 pounds of milk per hour by means of a separator with a capacity of 400 pounds. Much less can you expect to obtain 40 or 50 pounds from an udder with a five-pound secreting capacity. Some cows appear as if Nature had forgotten to leave a place for the udder. The second point, that of the power to digest and assimilate food, is in part indicated by the size of the abdomen and in part by the nervous energy of the cow. A large "bread basket" is essential. This is true of both the beef and dairy type of animal. If there is only sufficient room to hold enough for the production of heat and energy for the animal body, the chances of profit are certainly not bright. Large abdominal capacity is imperative, and in buying a cow for dairy purposes this should be paid due attention.

Along with this is desired a cow of good dairy temperament. The eye should be full and prominent, showing nervous force. The general appearance of the cow should give the impression of power, power to produce a large amount of milk and to do it economically. There is an inexpressible sense of the "fitness" of the cow for the work to be performed.

The amount of blood-flow passing through the udder is indicated by the size and length of milk veins. These should be large, long, and tortuous, ending in pronounced openings through the abdominal wall. These openings are known as milk wells.

Besides the points just mentioned there is the question of constitution. The vital organs of a cow, called upon, as they are, to assist in the performance of extremely arduous work, must have room to perform their action. The floor of the chest should not be tucked up and should have sufficient width to allow freedom of action of heart and lungs. How many cows do we see that lack in constitution? This makes them susceptible to all manner of illness and leaves them unable to perform with any degree of efficiency their natural functions.

CHIVES OF THE ONION FAMILY

This is a vegetable not widely known in this country, although it is native along the northern borders of the United States as well as in some parts of Europe where it is popular.

The plant belongs to the onion family and its leaves are used for seasoning in soups, salads, etc., and are preferred to onions by many persons because they are much milder and more tender. Europeans use chives for seasoning scrambled eggs and similar dishes.

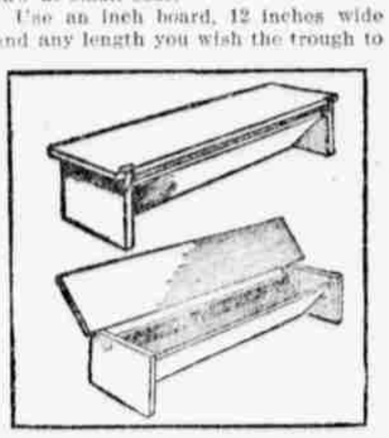
The culture of chives is simple. The plant will grow in any ordinary garden soil. It is usually propagated by division of the roots, because it does not seed readily. The roots or clumps of roots may be purchased at moderate prices. The clumps should be planted in beds about nine inches apart in rows which are two feet apart. The planting may be done in either spring or autumn. The chives may also be planted in the border of the vegetable garden, and make an excellent permanent border. As a border plant the clumps should be planted about six inches apart. The leaves will grow thickly and form a dense green mat.

After the plants are once established they require little attention, occasionally watering in dry weather helping to keep them fresh. It is a good plan to break up and replant the border or beds every three or four years as the continued cutting of the leaves for table use tends to weaken the plants.

FEED TROUGH WITH COVER

A successful poultryman suggests the following style of feed trough, which can be built with hammer and saw at small cost:

Use an inch board, 12 inches wide and any length you wish the trough to



Home-Made Feed Trough.

be. Rip the board lengthwise a half inch from the center, so that one-half of it is 5½ inches wide and the remainder is 6½. Nail together at right angles as a trough; then nail two boards 11x12 inches for end pieces, so they will extend three inches above the trough. Make a cover of 12-inch board to project and fasten to end pieces with rough T hinges.

The Best Wheat.—Defiance was found to be the best spring wheat and Turkey Red the best winter wheat for milling purposes in a test at the Colorado experiment station.